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Defense Expenditures and Socio-Economic Development in the Middle East and South Asia: A Factor Analytic Approach

Robert E. Looney
Naval Postgraduate School California, U.S.A

Introduction

During the 1980s and into the 1990s there has been a slowdown in defense spending and arms imports in many developing countries, especially in Middle East, and to a lesser extent South Asia and Northern Africa (USACDA, 1994). In large part reductions in allocations to the military have been brought on by growing fiscal problems, forcing governments to reorder their spending priorities. It is apparent that for the developing world as a whole, countries are examining the potential benefits of reduced allocations to the military. Depending on the relative impact of defense spending, shifts in resources may significantly affect the economic performance of these countries (Chan, 1885, 1987).

The purpose of this paper is to examine in some detail the manner in which defense expenditures and socio-economic development has evolved in the Middle East and South Asia over the period since the 1973/74 oil price increases. While the general scope of the study is on developing countries, attention is focused on seven of the more important nations in the region: Algeria, Egypt, Syria, Israel, Saudi Arabia, Pakistan and India. Several questions are addressed:

1. What are the country patterns and trends in defense and development spending ?
2. Have changes in defense expenditures exhibited any particular pattern with regard to movements in socio-economic development?
3. Do increased levels of defense expenditures curtail expenditures on other government allocations, particularly health and education?

The main hypothesis of the study is that developing countries are likely to show considerable variations with regard to the manner in which defense expenditures affect economic growth. In turn, these variations

reflect the underlying economic health of developing countries, and thus their relative ability to minimize potential adverse effects associated with increased defense burdens.

Literature Survey–The Impact of Defense Expenditures

A body of conventional wisdom has amassed over the years concerning the causes and consequences of Third World militarization. More often than not in the early literature this wisdom has been anecdotal and biased towards the standard "guns versus butter" analogies (Harris, 1988). Since the modern defense establishment is a heavy consumer of technical and managerial manpower and foreign exchange, resources that are especially scarce in the Third World, the conventional wisdom is that increased defense burdens should reduce the overall rate of growth (Deger and West, 1987; West, 1991)

To test this theory, a rapidly growing body of empirical research has attempted to identify the impact of defense spending on various aspects of economic.

development and growth. Numerous studies have examined various aspects of the debate. Unfortunately, no consensus has emerged. In the original studies,

Benoit (1973, 1978) found strong evidence to suggest that defense spending encouraged the growth of civilian output per capita in less developed countries.

On the other hand, Rothschild (1977) concluded that increased military expenditures lowered economic growth by reducing exports in fourteen OECD countries during 1956-69. In his examination of 54 developing countries for the sample period 1965-73, Lim found defense spending to be detrimental to economic growth (1983). Deger and Sen (1983), Leontief and Duchin (1983), and Faini, Annez and Taylor (1984), Biswas and Ram(1986) Grobar and Porter (1989), Lebovic and Ishaq (1987) also found evidence refuting the claim that defense spending stimulates economic growth.

In contrast, research examining the economic impact of Third World military expenditure utilizing various sub-groupings of countries has tended to contradict these findings. Much of this research implicitly argues that in certain economic situations by creating a stable environment it is possible that added defense expenditures may stimulate higher rates of investment, technological progress, technology transfer and hence increased overall growth (Wolf, 1981).

Emperically this research demonstrates a consistent pattern whereby certain groups of Third World countries–usually the more successful economically, the most stable politically, or those engaged in military production derive positive impacts from military spending. Those countries less successful economically, more politically unstable or lacking a domestic arms industry fail to derive any positive economic impacts from defense expenditures.

Summing up this body of research depending on the economic environment, defense expenditures have a number of channels through which they transmit impacts to the general economy (West, 1991) These include:

1. Resource Allocation Effects. Resource allocation effects occur when increases in military expenditures divert or re-allocate resources away from domestic civilian investment, public expenditures on government capital investment and current account expenditures on non-military inputs.

2. Resource Mobilization Effects Increases in military expenditures are expected to influence domestic savings through the following linkages: a reduction in social services, additional taxes, an increase in the social discount rate, and inflation.

3. Spin-off Effects. Military expenditure have impacts on economic growth through spin-off effects on human capital (such as may result from military training, education and modernization) and on the productivity of investment (such as provided by technology transfers).

4. Aggregate Demand Effects. In an economy with underutilized productive capacity, increased aggregate demand from military expenditures will result in increased output. This leads to a rise in capacity utilization and profit rates, in turn inducing an increase in investment rates thus placing the economy on a higher long-term growth path.

5. Debt Accumulation Effect. The debt accumulation effect describes the impact on current performance of debt accumulation attributable to past acquisition of military goods and services from abroad.

Methodology

Given the conflicting nature of impacts of these factors it is not clear a priori whether military expenditures will promote or hinder economic growth. The final effect on economic growth is the net outcome of positive and negative impacts conveyed through the various channels. The net outcome is likely to differ across countries and through time.

As a starting point and to get a broad overview of the main patterns characterizing the interrelationship between defense expenditures, social expenditures and socio-economic performance were factor analyzed[1]. Formally as an initial step in exploratory data analysis factor analysis has three objectives: to study the correlations of a large number of variables by clustering the variables into factors such that variables within each factor are highly correlated; to interpret each factor according to the variables belonging to it; and to summarize many variables by a few factors (Rummel,1970).

The usual factor analysis model expresses each variable as a function of the factors common to several variables and a factor unique to the variable:

$$zj = aj1F1 + aj2F2 + ... + ajmFm + Uj$$

Where

zj = the jth standardized variable

m = the number of factors common to all the variables

Uj = the factor unique to variable zj

aji = factor loadings

The number of factors, m, should be small and the contribution of the unique factors should also be small. The individual factor loadings, aji, for each variable should be either very large or very small so each variable is associated with a minimal number of factors.

To the extent that this factor analysis model as appropriate for the problem at hand, the objectives stated above can be achieved. Variables with high loadings on a factor tend to be highly correlated with each other, and variables that do not have the same lading patterns tend to be less highly correlated. Each factor is interpreted according to the magnitudes of the loadings associated with it.

Perhaps more importantly for the problem at hand, the original variables can be replaced by the factors with little loss of information. Each case (country receives a score for each factor; these factor scores can be computed as (Frane and Hill, 1987):

$$Fi = bi1z1 + bi2z2 + ...bipzp$$

where bij are the factor score coefficients. Factor scores are in turn used in the regression/decision tree (Angoss, 1994) analysis that follows. In general these factor scores have less error and are therefore more

reliable measures, than the original variables. The scores express the degree to which each case possess the quality or property that the factor describes. The factor scores have a mean of zero and standard deviation of one.

Operationally the computations of factors and factor scores for each industry were performed (BMDP, 1992) using a principle components procedure. The data consisted of a sample of 110 developing countries over four year intervals: 1974, 1978, 1982 and 1986 (the last year of available comparable data).

In short the advantage of factor analysis for analyzing the problem at hand lies largely in this method's ability to derive composite indices, based on a weighted average of variables. For example, countries may vary considerably with regard to their ranking on the military burden as opposed to a ranking based on per capita military expenditures, or the share of military expenditures in the budget. By creating a militarization dimension incorporating the various measures of military expenditures, factor analysis allows us to avoid arbitrarily picking one measure of militarization for subsequent analysis. The militarization dimension created by factor analysis should be more indicative of the commitment of national resources to the military than that obtained through reliance on any one single measure In this regard we are interested in determining:

(1) the manner in which defense expenditures have interacted with the process of socio-economic development (2) whether this interaction has changed over time; (3) differences in these Interactions between different country groupings, and most importantly (4) the evolution of our sample countries with regard to their relative levels of defense expenditure, socio-economic development and the provision of health and educational services.

The variables included in the analysis were:

Military Variables: (a) military expenditures as a share of Gross National Product, (b) military expenditures share in the central government budget, (c) military expenditures per soldier, and (d) armed forces per capita.

Non-Military, Public Expenditures: (a) educational expenditures per capita, (b) health expenditures per capita, and (c) total (including defense) expenditures share in Gross National Product.

Measures of Socio-economic Performance: (a) per capita income, (b) the percentage of the school age population in school, (c) literacy rate,

(d) school age population per teacher, (e) infant mortality, (fl teachers per capita and (g) population per hospital bed.

Two additional variables were added: (a) a regional variable,[2] differentiating the Middle East, North African and South Asian countries and (b) a variable depicting the level of violence[3] used by governments against their populations. The former variable was included to determine the manner in which the Middle Eastern, South Asian and North African countries differ from the rest of the developing world. The latter was included to determine to what extent military expenditures were related to internal (as opposed to external) factors.

A representative pattern[4] (Table 1) shows the major dimensions of the data and indicates the manner in which each of the individual variables are correlated with the respective dimensions. For each of the four years examined several different factor analysis were performed.

First the total sample of countries was factor analyzed (as in Table 1). Next, several additional factor analysis were undertaken to determine if any major differences in military expenditures/socio economic performance existed for sub- groupings of countries. Specifically, based on the initial total country results for each of the years examined, countries were grouped on the basis of factor scores as high (factor scores greater than zero) or low (factor scores less than zero) in terms of militarization and socio-economic performance.

Additional factor analyses were performed on each of the four sub groupings to determine if their member countries differed significantly from other country groupings with regard to their patterns of military expenditure, public expenditure and socio-economic performance. For example, countries with high levels of militarization (factor scores greater than zero on Factor 2 in Table 1) were factor analyzed to determine if they differed with regard to their patterns of military expenditure/public expenditure per capita from countries with low levels of militarization. Similarly do countries with high levels of socio-economic performance differ from those with low socio-economic performance with regard to the manner in which military expenditures are related to public expenditures per capita?

The resulting country factor scores[5] (Tables 2 and 3) indicate the relative ranking of each of the sample countries on each of the main trends in the data.

Table 1
Patterns of Government Expenditures and Socio-Economic Development: Developing Countries, 1974
(varimax rotation, standardized regression coefficients)

Variable	Factor1 Public Expend/ Capita	Factor2 Military Expend	Factor3 Socio- Economic Performance	Factor4 Region
Educational Expen Cap	0.94*	0.10	0.17	0.01
Per Capita Income	0.91*	0.08	0.16	0.05
Health Expend Cap	0.91*	0.11	0.20	- 0.06
Military Exp/ GNP	0.07	0.98*	- 0.00	- 0.01
Government Exp/ GNP	0.14	0.91 *	0.05	- 0.14
Military Exp/ Budget	- 0.02	0.81 *	- 0.06	0.25
Military Exp/ Soldier	0.54	0.60*	- 0.11	- 0.20
Armed Forces Capita	0.45	0.50*	0.33	0.21
Sch Age Pop in Sch	0.25	- 0.02	0.86*	- 0.16
Literacy Rate	- 0.04	- 0.05	0.86*	- 0.13
Sch Age Pop/ Teach	- 0.20	- 0.08	- 0.79*	0.05
Teachers / Capita	0.54*	0.04	0.72*	- 0.02
Infant Mortality	0.01	0.07	- 0.47	- 0.40
Pop per Hosp Bed	- 0.20	- 0.08	- 0.40	0.72*
Mideast-Asia	0.38	0.42	- 0.06	0.61 *
EIGENVALUES	**5.38**	**3.20**	**1.69**	**1.16**
Factor Scores				
Egypt	- 0.92	2.74	0.21	0.19
Israel	1.25	4.35	1.44	0.08
Saudi Arabia	2.1 4	0.98	- 1 .38	- 0.23
Syria	- 0.64	1.85	0.75	1.17
India	- 0.42	- 0.01	0.02	1.36
Pakistan	- 0.67	0.92	- 0.65	1.93
Algeria	0.18	- 0.20	- 0.05	0.34

Notes: Based on obliquely rotated factor analysis. Data from: Ruth Sivard, World Military And Social Expenditures (Washington: World Priorities), various issues.

Factor scores were also computed for our group of sample countries relative to those nations in the North African/Middle East/South Asian region as a whole (Table 4).

Summarizing the major patterns for our sample countries over the 1974-1986 period:

1974

At the beginning of the period (1974), for developing countries a whole (Table 1):

(a) Military expenditures were distinct, having little correlation with other measures of socio-economic development.

(b) Israel was by far the most militarized of the sample countries followed by Egypt, Syria, Saudi Arabia, and Pakistan. All of these countries were above average (by Third World standards) in terms of military expenditures/armed forces.

(c) In contrast, India and Algeria were somewhat below average in terms of their allocations to the military.

(d) Only Israel, Saudi Arabia and Algeria sustained higher than average levels of non-defense public expenditures, and finally

(e) Saudi Arabia, Pakistan and Algeria lagged somewhat below developing countries as a whole in terms of their levels of socio- economic performance.

At this time, both the Middle Eastern/South Asian countries and those in other parts of the developing world had fairly similar patterns of military expenditure/socio- economic development. Several significant differences did occur, however:

1. Countries with higher than average military expenditures–Egypt, Israel, Saudi Arabia, Syria and Pakistan–tended to have increased levels of socio- economic performance associated with higher military participation rates (the number of soldiers per 1000 population).

2. Countries, including India and Algeria, experiencing lower than average levels of militarization tended to have a positive association between armed forces per capita and military expenditure per soldier and health/education expenditures per capita, rather than with overall increases in socio-economic performance.

This latter phenomenon associated with the military participation rate in the low militarized countries also appears to be somewhat stronger for the

Table 2

Summary: Patterns of Military Expenditure Relative to Socio-Economic Development and Public Expenditures Per Capita (factor scores)

Country	Military Expenditures	Socio-Economic Performance		Public Expenditures	
		Total Country Sample	Military Expenditure Group	Total Country Sample	Military Expenditure Group
1974					
Egypt	2.74	0.21	0.02	- 0.92	- 0.72
Israel	4.35	1.44	1.63	1.25	1.41
Saudi Arabia	0.98	-1.38	-1.25	2.14	2.66
Syria	1.85	0.75	0.65	- 0.64	- 0.63
India	- 0.01	0.02	- 0.06	- 0.42	- 0.11
Pakistan	0.92	- 0.65	- 0.64	- 0.67	- 0.94
Algeria	- 0.20	- 0.05	- 0.44	0.18	0.42
1978					
Egypt	1.98	0.04	0.00	- 0.57	- 0.72
Israel	3.93	1.74	1.93	0.40	1.41
Saudi Arabia	1.63	- 1.81	- 1.30	3.83	2.66
Syria	2.63	0.68	0.60	- 0.63	- 0.63
India	- 0.17	- 0.21	- 0.23	- 0.35	- 0.50
Pakistan	0.41	- 0.67	- 0.67	- 0.51	- 0.94
Algeria	- 0.16	- 0.63	- 0.35	0.25	0.83
1982					
Egypt	1.01	- 0.14	- 0.07	- 0.46	- 0.27
Israel	4.11	1.82	1.86	- 0.06	- 0.10
Saudi Arabia	1.02	- 1.44	- 0.92	6.42	4.40
Syria	2.34	0.74	0.61	- 0.66	- 0.78
India	0.07	- 0.50	- 0.61	- 0.18	- 0.37
Pakistan	0.81	- 1.11	- 1.23	- 0.14	- 0.1 7
Algeria	- 0.04	- 0.05	0.26	0.00	0.32
1986					
Egypt	0.96	0.04	0.00	- 0.35	- 0.78
Israel	2.49	1.04	0.97	1.38	1.42
Saudi Arabia	1.83	- 1.44	- 0.74	4.66	2.68
Syria	2.41	0.74	0.59	- 0.75	- 0.70
India	- 0.05	- 0.29	- 0.20	- 0.20	- 0.02
Pakistan	0.71	- 1.36	- 1.53	- 0.23	- 0.02
Algeria	- 0.41	0.41	0.66	0.55	0.63

Table 3

Summary: Patterns of Socio-Economic Development Relative to Military Expenditures and Public Expenditures Per Capita (factor scores)

Country	Military Expenditures	Socio-Economic Performance		Public Expenditures	
		Total Country Sample	Military Expenditure Group	Total Country Sample	Military Expenditure Group
1974					
Egypt	0.21	2.74	2.75	- 0.92	- 1.52
Israel	1.44	4.35	4.73	1.25	0.30
Saudi Arabia	- 1.38	0.98	0.97	2.14	2.07
Syria	0.75	1.85	1.82	- 0.64	0.41
India	0.02	- 0.01	0.04	- 0.42	- 0.22
Pakistan	- 0.65	0.92	1.12	- 0.67	- 0.56
Algeria	0.05	- 0.20	- 0.06	0.18	- 0.04
1978					
Egypt	0.04	1.98	1.68	- 0.57	- 0.63
Israel	1.74	3.93	4.18	0.40	0.71
Saudi Arabia	- 1.81	1.63	1.37	3.83	2.67
Syria	0.68	2.63	2.67	- 0.63	- 0.75
India	- 0.21	- 0.17	- 0.25	- 0.35	- 0.28
Pakistan	- 0.67	0.41	0.44	- 0.51	- 0.44
Algeria	- 0.63	- 0.16	0.37	0.25	0.41
1982					
Egypt	- 0.14	1.01	1.26	- 0.46	- 0.54
Israel	1.82	4.11	4.08	- 0.06	- 0.02
Saudi Arabia	-1.44	1.02	0.39	6.42	5.81
Syria	0.74	2.34	2.34	- 0.66	-0.03
India	- 0.50	0.07	0.05	- 0.18	- 0.31
Pakistan	-1.1 1	0.81	0.94	- 0.14	- 0.40
Algeria	0.05	- 0.04	-0.36	0.00	0.00
1986					
Egypt	0.04	0.96	0.69	- 0.35	- 0.25
Israel	1.04	2.49	2.51	1.38	0.94
Saudi Arabia	- 1.44	1.83	0.50	4.66	5.52
Syria	0.74	2.41	2.21	- 0.75	- 0.56
India	- 0.29	- 0.05	0.46	- 0.20	- 0.60
Pakistan	- 1.36	0.71	0.99	- 0.23	- 0.34
Algeria	0.41	- 0.41	- 0.35	0.55	0.40

Table 4

Summary: Evolution of Militarization and Socio-Economic Performance in the Middle East/South Asian Region, 1974-1986 (factor scores)

Country	Militarization	Socio-Economic Performance	Public Expenditures
1974			
Egypt	1.31	0.35	- 0.87
Israel	2.41	1.77	0.43
Saudi Arabia	0.35	- 0.78	1.30
Syria	0.74	0.43	- 0.90
India	- 0.47	0.01	- 0.64
Pakistan	0.30	- 0.70	- 0.73
Algeria	- 0.69	0.04	- 0.32
1978			
Egypt	0.75	0.29	- 0.75
Israel	2.05	1.75	0.25
Saudi Arabia	0.65	- 0.83	1.21
Syria	1.19	0.58	- 0.34
India	- 0.73	- 0.07	- 0.61
Pakistan	- 0.09	- 0.82	- 0.55
Algeria	- 0.93	0.35	- 0.34
1982			
Egypt	- 0.07	0.19	- 0.42
Israel	1.82	1.86	- 0.35
Saudi Arabia	0.65	- 0.70	3.61
Syria	0.80	0.90	- 0.70
India	- 0.70	- 0.20	- 0.36
Pakistan	0.08	- 1.14	- 0.45
Algeria	- 0.80	0.49	- 0.20
1986			
Egypt	- 0.02	0.12	- 0.41
Israel	1.1 2	1.33	0.19
Saudi Arabia	1.01	- 0.92	3.41
Syria	1.02	0.81	- 0.83
India	- 0.80	- 0.12	- 0.39
Pakistan	0.19	- 1.44	- 0.47
Algeria	- 1.29	0.77	0.01

Note: Factor scores are relative to the Middle East/South Asian region as a whole.

Middle Eastern/South Asian countries than is the case for countries outside the region. In addition, the regional dimension was also significant in affecting the pattern of public expenditure with the high expenditure Middle East/South Asian countries experiencing greater public expenditures and armed forces per capita than their counterparts in other parts of the developing world. Similarly, the low public expenditure countries in the region had higher levels of militarization than those in other regions.

Finally, in 1974, countries with relatively high levels of socio-economic attainment appeared capable of increasing their military expenditure per soldier and armed forces per capita while at the same time sustaining higher levels of health and educational expenditures. It should be noted, however, that of the sample countries only Israel was above average with respect to this phenomena. India, Syria and Egypt were considerably below the average for developing countries as a whole with regard to this pattern of military participation/expenditure and socio-economic performance. Given their level of socio-economic performance, all of the sample countries had relatively high levels of military expenditure, with Egypt, Israel and Syria considerably above the norm.

For countries with a low level of socio-economic attainment, both military expenditures per capita and armed forces per capita, while also positively associated with health and educational expenditures, were more closely associated with other measures of military expenditures.

1978

By 1978, both Saudi Arabia and Syria had experienced significant increases in their relative degree of militarization. In contrast, both Egypt and Israel suffered a relative decline with regard to this dimension. Several other developments were also of significance.

1. In contrast to 1974, military expenditures per soldier increased their degree of association with other types of government expenditures. This pattern was reinforced even further in the Middle East/South Asian region.

2. Countries with relatively high levels of military expenditures in 1978 experienced a fairly close association between their military expenditures (as a share of GNP) and total government expenditures (as a share of GNP). By this time, Egypt, Israel, Saudi Arabia, Syria, and Pakistan all had levels of military expenditure that were high, even relative to the highly militarized group of developing countries.

3. Countries with a high level of military expenditures in the Middle

East/South Asian region also had abnormally high levels of military expenditure as a share of the government budget and high levels of armed forces per capita.

Amongst the countries with relatively low levels of defense expenditure, the regional dimension was significant for only armed forces per capita.

4. The regional dimension was also significant for countries characterized as having above average levels of public expenditures per capita. The Middle Eastern/South Asian countries in this group again had relatively high levels of military expenditure and public expenditure per capita.

5. Countries in the Middle East/South Asia region with relatively low levels of public expenditure per capita also tended to have relatively high levels of military expenditures. However, unlike with the high expenditure group, the regional dimension was not significant in terms of the level of public expenditure per capita.

6. Military expenditures per soldier was highly correlated with other forms of public sector expenditures for the countries experiencing a high level of socio- economic performance. For these countries, the Middle East/South Asian regional dimension was also associated with the military expenditure dimension. Also, at this time, Egypt, Israel and Syria experienced a high level of military expenditure (relative to other countries with a high level of socio- economic performance).

7. For the sample countries with low socio-economic performance, Saudi Arabia's military expenditures were above average and its level of non-military public expenditures considerably above average.

1982

In 1982, the military expenditures per soldier term continued its trend toward closer association with other types of public expenditures. In the Middle East/South Asia region, armed forces per capita continued its trend towards greater association with socio-economic performance, while in countries outside the region this measure of militarization was more closely associated with the general military burden (military expenditures share in GNP). In addition to these patterns:

1. The Middle East and South Asian countries differed with countries in other parts of the world with regard to the manner in which government repression was associated with militarization: outside the region, repression manifested itself largely in a larger proportion of the central government budget allocated to defense. In the Middle East/South Asian

countries, no strong correlation existed between repression and allocations to defense.

2. As in the past, the highly militarized countries tended to have a regional dimension whereby the Middle East/South Asian group had an abnormally high share of military expenditures in the central government budget, together with relatively high levels of military participation–armed forces per 1000 population.

3. For these countries, military expenditures per soldier continued to be highly correlated with other per capita public allocations.

4. Countries with lower than average militarization also had experienced a fairly close association between the military participation rate and overall socio-economic performance.

5. Interestingly enough, countries with above average levels of public expenditure per capita tended to have an inverse relationship between repression and the military participation rate and the share of the government budget allocated to defense. It should be noted, however, that of the sample countries only Saudi Arabia was classified in this group in 1982.

6. As noted, in 1982, with the exception of Saudi Arabia, all of the sample countries had relatively low levels of public expenditure per capita. In addition, each of these countries–Egypt, Israel, Syria, India, Pakistan and Algeria–had relatively high levels of military expenditure, compared to similar countries in other parts of the world. Still, for countries of below average public expenditure per capita, Egypt, Israel, Syria and Algeria had above average levels of socio-economic performance.

Finally, in 1982, the regional dimension was prominent in both country groupings based on the level of socio-economic development. That is, military expenditure in each group of countries (high and low) was correlated with the regional dimension, i.e., everything else equal in terms of socio-economic performance, the Middle East and South Asian countries had significantly higher levels of militarization than other parts of the developing world. Repression in the high socio-economic group was inversely correlated with the degree of socio-economic performance, but in the low socio-economic group, repression was not associated with any of the main measures of expenditure/performance.

1986

At the end of the period under consideration, Egypt, Israel, Saudi Arabia, Syria, and Pakistan all continued to have above average levels of militarization. India was slightly below the average for developing

countries, while Algeria was considerably below that of the other sample countries. Compared with the beginning of the period (1974), Egypt, Israel and Pakistan had experienced relative declines in militarization, while Saudi Arabia and Syria had made significant increases in the relative amount of resources allocated to the military. Of the countries with relatively low levels of military expenditure, India and Algeria had slight declines, relative to 1974, in their ranking on the basis of relative militarization. In addition:

1. At this time, repression in the Middle East/South Asian region was not associated with military or social expenditures. Again, for these countries the military participation rate was fairly closely correlated with their level of socio-economic performance. As in the past, military expenditures per soldier was highly correlated with other forms of public expenditure per capita.

2. Developing countries outside the Middle East/South Asia region tended to increase the share of their budgets allocated to defense as their degree of repression increased. In addition, their rates of military participation tended to be less correlated with socio-economic performance than was the case in the Middle East.

3. Interestingly enough, countries experiencing high levels of militarization at this time had an inverse correlation between repression and their public expenditures per capita. For these countries, the shares of GNP allocated to military expenditure and total government expenditures were fairly strongly correlated to each other and to the regional dimension.

4. Of the highly militarized sample countries, Israel and Syria had above average levels of socio-economic performance. Egypt was average, while Saudi Arabia and Pakistan continued to have below average levels of socio-economic performance.

5. In the case of the less militarized countries, repression was, more than in the past, associated with the military burden (the share of GNP allocated to defense) as well as the share of the budget allocated to defense.

6. Of the sample countries with above average levels of public expenditure per capita, only Israel had an above average level of socio-economic performance. Saudi Arabia was still considerably below the norm.

7. On the other hand, of the sample countries with relatively low levels of public expenditure per capita, Egypt and Syria had above average

levels of social economic performance. All of the sample countries with below average levels of public expenditure had relatively high levels of militarization.

Finally, the regional dimension was still present with regard to countries above and below the average with regard to socio-economic performance. For both groups, the Middle East/South Asian countries had relatively high levels of military expenditure. Again, Algeria was the notable exception in this regard.

Summary and Implications

The patterns noted above provide insight as to the manner in which the sample countries differ with regard to their patterns of military expenditures, socio-economic development and overall pattern of public expenditures. Clearly, there are a number of similarities between the sample countries, in particular, their generally high levels of military expenditures and their fairly high levels of non-defense expenditures per capita. On the other hand, a number of significant differences exist, particularly with regard to levels of and movements in socio-economic performance.

Here, it should be emphasized that several trends identified above suggest the economic affects of military expenditures in the sample countries have changed over time. Specifically, during the period under consideration, several subtle shifts occurred in the manner in which military expenditures and the military participation rate were associated with public expenditure per capita. More importantly, similar shifts occurred in the manner in which the military participation rate interacted with socio-economic performance. In general (Tables 5 and 6):

1. For the total sample of countries, military expenditures per soldier became increasingly associated with non-defense expenditures per capita. At the same.

2. The Middle Eastern countries differed from developing countries in general with regard to the manner in which the military participation rate affected socio-economic performance. For developing countries as a whole, the correlation between military participation and socio-economic performance was fairly constant over time. In contrast, military participation became increasingly positively correlated over time with socio-economic performance.

3. As with developing countries as a whole, the military participation rate in the Middle East/South Asian countries became less associated over

time with public non-defense expenditures.

4. The reverse was the case for non-Middle Eastern/South Asian countries. For these nations, the relationship between the military participation rate and socio-economic performance was relatively stable. At the same time, these countries experienced a slight positive increase in the association between the military participation rate and public expenditure per capita.

5. In countries with a high level of militarization, the affect on socio-economic performance of the military participation rate declined over time. On the other hand, this factor increased in importance as a positive factor contributing to improved socio-economic performance in the countries with low levels of militarization. Interestingly enough, the military participation rate was less associated over time with public expenditures in both the high and low military expenditure countries.

Taking the analysis one step further, these patterns should be reflected in differences in budgetary behavior between Middle East and non-Middle East countries. Specifically, we would expect the Middle East countries to experience fewer severe trade-offs between defense expenditure and allocations to human capital/social budgetary categories. One way of assessing whether Middle East/non-Middle East countries have fundamentally different budgetary allocation processes is to profile each group through developing a cluster/regression tree framework. A detailed description of the technical aspects underlying this analysis is provided in Briedman, Friedman, Olshen and Stone (1984) and de Ville (1990). Briefly a cluster analysis is used to find the relationship between the dependent variable and each predictor. The approach finds groups that maximize similarity within a sample group and dissimilarity between the groups. One product of the analysis is a series of decision (if/then) rules (Table 7).

Here we were interested in examining whether and the extent to which Middle Eastern countries differed from their counterparts in other parts of the world with regard to linkages between social expenditures and allocations to the military.

This process can be best described by examining our results for 1982[6]. Using the social expenditures dimension estimated in the factor analysis as a dependent variable, this analysis found that:

1. Whether or not a country was a middle eastern economy was the most important predictor of likely social expenditures (Figure 1). That is the mean score on the social expenditure factor for all countries was 0 (shown

Table 5

Summary: Main Correlations Between Government Expenditures Socio-Economic Performance, by Region, 1974-86 (standardized regression coefficients)

Country Grouping	Military Variable	Factor	
		Socio-Economic Performance	Public Expenditures
Total Sample			
1974	Military Exp/Soldier	- 0.11	0.54
1978	Military Exp/Soldier	0.11	0.73
1982	Military Exp/Soldier	0.09	0.84
1986	Military Exp/Soldier	- 0.02	0.84
1974	Armed Forces/Capita	0.33	0.45
1978	Armed Forces/Capita	0.34	0.25
1982	Armed Forces/Capita	0.41	0.15
1986	Armed Forces/Capita	0.33	0.12
Middle East			
1974	Military Exp/Soldier	0.10	0.63
1978	Military Exp/Soldier	- 0.04	0.62
1982	Military Exp/Soldier	- 0.07	0.92
1986	Military Exp/Soldier	0.00	0.93
1974	Armed Forces/Capita	0.10	0.43
1878	Armed Forces/Capita	0.33	0.34
1982	Armed Forces/Capita	0.55	- 0.09
1986	Armed Forces/Capita	0.43	- 0.17
Non-Middle East			
1974	Military Exp/Soldier	- 0.04	0.55
1978	Military Exp/Soldier	0.08	0.17
1982	Military Exp/Soldier	0.06	0.89
1986	Military Exp/Solider	0.11	0.89
1974	Armed Forces/Capita	0.34	0.12
1978	Armed Forces/Capita	0.34	0.39
1982	Armed Forces/Capita	0.42	0.40
1986	Armed Forces/Capita	0.36	0.37

Table 6

Summary: Main Correlations Between Government Expenditures and Socio-Economic Performance, by Expenditure Classification, 1974-86

(standardized regression coefficients)

Country Grouping	Military Variable	Factor	
		Socio-Economic Performance	Public Expenditures
High Militarization			
1974	Military Exp/Soldier	- 0.22	0.60
1978	Military Exp/Soldier	- 0.18	0.60
1982	Military Exp/Soldier	- 0.14	0.91
1986	Military Exp/Soldier	- 0.04	0.77
1974	Armed Forces/Capita	0.62	0.26
1978	Armed Forces/Capita	0.51	0.33
1982	Armed Forces/Capita	0.60	0.09
1986	Armed Forces/Capita	0.42	0.18
Low Militarization			
1974	Military Exp/Soldier	0.19	0.68
1978	Military Exp/Soldier	0.04	0.81
1982	Military Exp/Soldier	- 0.14	0.91
1986	Military Exp/Solider	0.07	0.91
1974	Armed Forces/Capita	0.05	0.73
1978	Armed Forces/Capita	0.46	0.32
1982	Armed Forces/Capita	0.59	0.34
1986	Armed Forces/Capita	0.58	0.31
High Public Expenditure Per Capita			
1974	Military Exp/Soldier	0.44	0.32
1978	Military Exp/Soldier	0.27	0.34
1982	Military Exp/Soldier	0.19	0.77
1986	Military Exp/Soldier	- 0.11	0.94
1974	Armed Forces/Capita	- 0.33	0.58
1978	Armed Forces/Capita	0.03	0.43
1982	Armed Forces/Capita	0.19	- 0.04
1986	Armed Forces/Capita	0.36	0.00
Low Public Expenditure Per Capita			
1974	Military Exp/Soldier	0.04	0.04
1978	Military Exp/Soldier	0.07	- 0.06
1982	Military Exp/Soldier	0.11	0.19
1986	Military Exp/Solider	0.09	0.16
1974	Armed Forces/Capita	0.49	0.49
1978	Armed Forces/Capita	0.26	0.57
1982	Armed Forces/Capita	0.20	0.64
1986	Armed Forces/Capita	0.18	0.72

here as -0 due to rounding off). If a country was not from the middle east its' expected score on this dimension was 0.19. If the country was in the middle east, it's expected score was 0.87.

2. For the non-middle east countries, the militarization dimension was the most important in determining their status as non-middle east. Countries with a militarization score of -1.363 to -0.488 had average social expenditure scores of -0.02 while those with militarization scores of -0.488 to 4. average social expenditure scores of -0.31. This suggests that for non-Middle Eastern countries as a whole, increased militarization is associated with reduced levels of social expenditures.

3. Whether or not a country was an oil producer (1 = non-producer; 2 = producer) was the most important factor in determining the level of militarization in the non- Middle Eastern countries.

Here oil producers had consistently higher levels of social expenditure 0.73 for the low militarization countries and 1.34 for the high militarization countries.

4. In contrast relative militarization was not a factor in predicting whether a country would be in the middle east. For these countries oil production was the only statistically significant variable found to be associated with social expenditures. It should be noted here that the oil producers ranked considerably higher (2.22 versus 0.73 and 1.34) on the social expenditure scale than did producers outside the region.

In short these findings suggest that middle eastern and non-middle eastern countries differ significantly in the manner in which they form budgetary priorities. In the non-Middle Eastern states, distinct tradeoffs exist between military and social allocations. In the Middle East, no such patterns appear to be present.

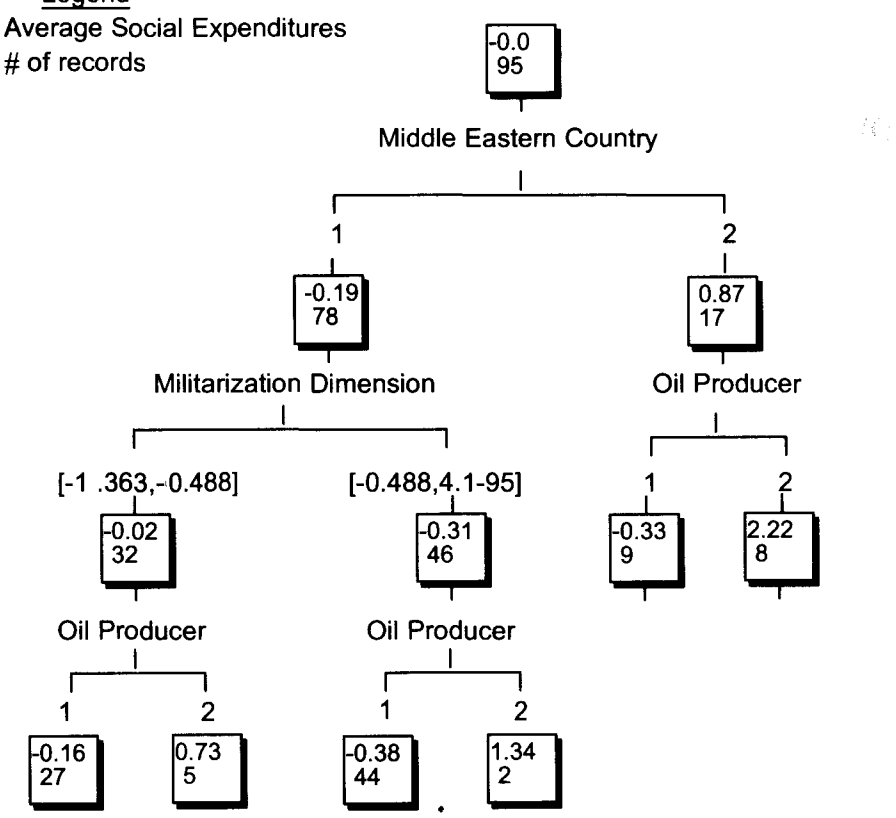
Conclusions The patterns of the military participation rate and socio-economic performance noted above are consistent with an earlier study (Looney, 1992) which concluded that for the Arab World as a whole, human capital development and improvements in literacy have proceeded in a somewhat unique manner. For these countries, improvements in literacy have been much more closely associated with the military participation rate than in other parts of the world. Findings consistent with the ones reported here have also been noted in the scholarly literature. (Dixon and Moon, 1987; Bullock and Firebaugh'1990; Babin'1990; Weede,1983, 1986, 1993) While this relationship appears to be weakening somewhat, it is-still a dominant factor in these countries.

Having said this, the reason for this pattern is not completely clear. Clearly part of the explanation is due to the lack of a discernible tradeoff between defense and social expenditures. This phenomenon is not one simply associated with oil, but instead appears to apply to both oil and non-oil countries through out the region. While (Weede, 1983, 1986, 1993) has also speculated at length on related

phenomenon, it is not clear whether the observed improvements in literacy associated With military participation are due to some particular

Figure 1

Determinants of Social Expenditures, 1982



Notes: Top number in each box represents the average group factor score on the social expenditure dimension. The bottom number indicates the number of countries possessing the specified attributes (Angoss Software, 1994).

Table 7

Derived Decision Rules Concerning Likely Levels of Social Expenditures

Rule

[1]
IF:
- Middle Eastern Country = 1 (non-Middle East)
- Militarization Dimension = [-1.363,-0.488)
- Oil Producer = 1 (non-producer)

THEN :
expected Social Expenditures = -0.16111; std = 0.22495

[2]
IF:
- Middle Eastern Country = 1 (non-Middle East)
- Militarization Dimension = [-1.363,-0.488)
- Oil Producer = 2 (oil producer)

THEN:
expected Social Expenditures = 0.73446; std = 0.5321

[3]
IF:
- Middle Eastern Country = 1 (non-Middle East)
- Militarization Dimension = [-0.488,4.195]
- Oil Producer = 1 (non-producer)

THEN:
expected Social Expenditures = -0.38049; std = 0.2182

[4]
IF:
- Middle Eastern Country = 1 (non-Middle East)
- Militarization Dimension = [-0.488,4.195]
- Oil Producer = 2 (oil producer)

THEN:
expected Social Expenditures = 1.3377; std = 1.7067

[5]
IF:
- Middle Eastern Country = 2 (Middle East)
- Oil Producer = 1 (non-producer)

THEN:
expected Social Expenditures = -0.33151; std = 0.3567

[6]
IF:
- Middle Eastern Country = 2 (Middle East)
- Oil Producer = 2 (oil producer)

THEN:
expected Social Expenditures = 2.2159; std = 2.1366

Source: Derived from Figure 1

success of Middle Eastern militaries in training recruits, or do they simply reflect deficiencies in the civilian educational systems? Would comparable allocations to conventional schools have produced better progress toward national literacy and skill improvement? Common sense would suggest that this is probably the case. Still a follow up study should be made assessing the cost effectiveness of traditional methods of schooling.

Foot notes

(1) Analysis was performed using the BMDP Statistical Program. For a complete description of the actual computations see BMDP, 1992.

(2) The countries grouped as middle east/asian were: Turkey, Bahrain, Cyprus, Egypt, Iran, Iraq, Israel, Jordan, Kuwait, Lebanon, Oman, Qatar, Saudi Arabia, Syria, UAE, Yemen Arab Republic, Peoples Democratic Republic of Yemen, Afghanistan, Bangladesh, India, Nepal, Pakistan, Sri Lanka, Algeria, Libya, Morocco, Somalia, Sudan and Tunisia.

(3) This variable has values of 1, 2, and 3 indicating increasing levels of government repression. The data are provided by Sivard (various dates) but are only for the years 1986 and 1982.

(4) A varimax rotation (BMDP, 1992) was used in the analysis. Factors were selected on the basis of having an eigenvalue greater than one.

(5) A full set of detailed results from the factor analysis are available from the author upon request.

(6) Similar results were found for the other years examined: 1974, 1978, 1986. Copies of these findings are available from the author upon request.

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